Forest Inventory & Analysis & AB1504 Reporting Update

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What is FIA?

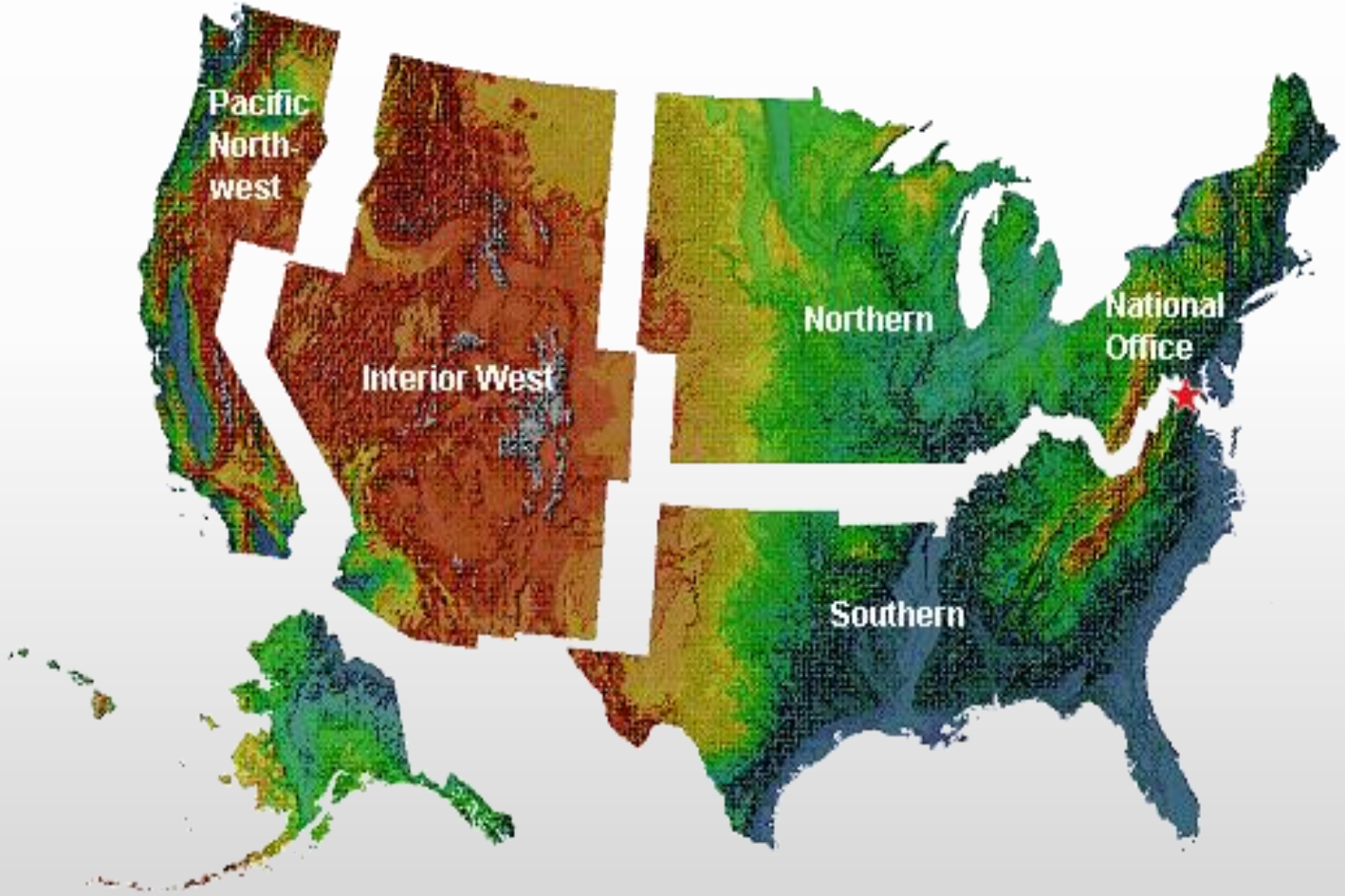
- We are the Nation's Forest Inventory
- Program authorized by Congress in 1928
- Initially an inventory of marketable timber
  - Periodic data collection - State-by-state basis, intervals varied by state
- 1998 Farm Bill - Annualized inventory for all forest resources
  - Annual inventory to provide data on status and trends
  - Inventory all forest lands, on all ownerships
  - Consistent sampling protocol, compilation, database, reporting requirements

What is FIA – Funding and Direction

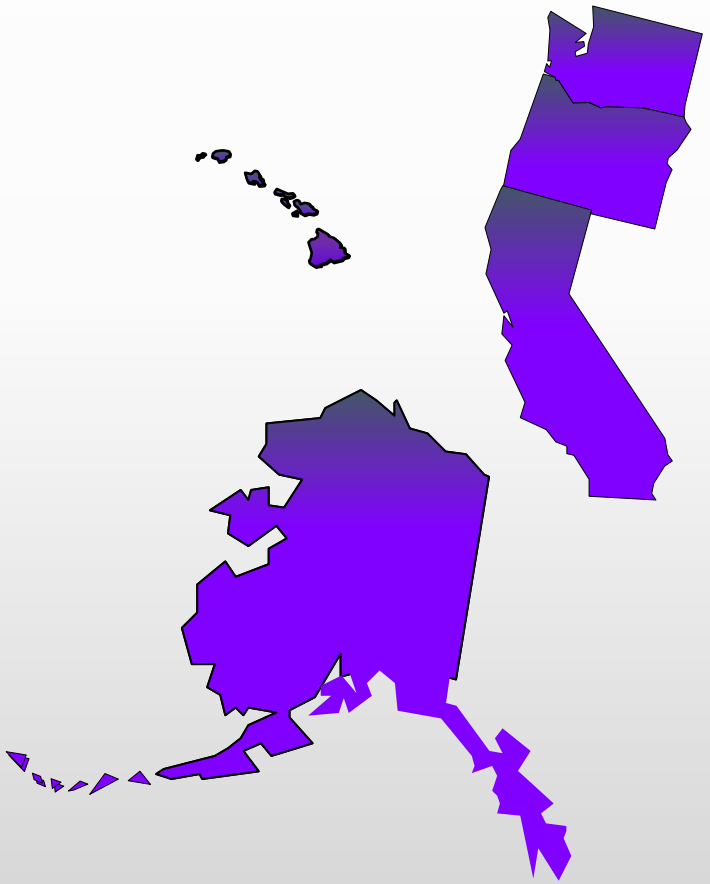
- How is FIA funded?
  - Annual Congressional appropriations
  - Agreements with state cooperators, universities, government agencies
  - Partnerships with other branches of the Forest Service: National Forest Systems, State and Private, other R&D programs
- Who provides FIA direction and oversight?
  - Provided through national office, regional work units, national stake holders, and regional representatives
    - Western states representative is Mark Rosenberg

FIA is a National Program

4 Regions - “work units”



Pacific Northwest (PNW – FIA)



Alaska

California

Oregon

Washington

Hawaii

Guam

American Samoa

Palau

Marshall Islands

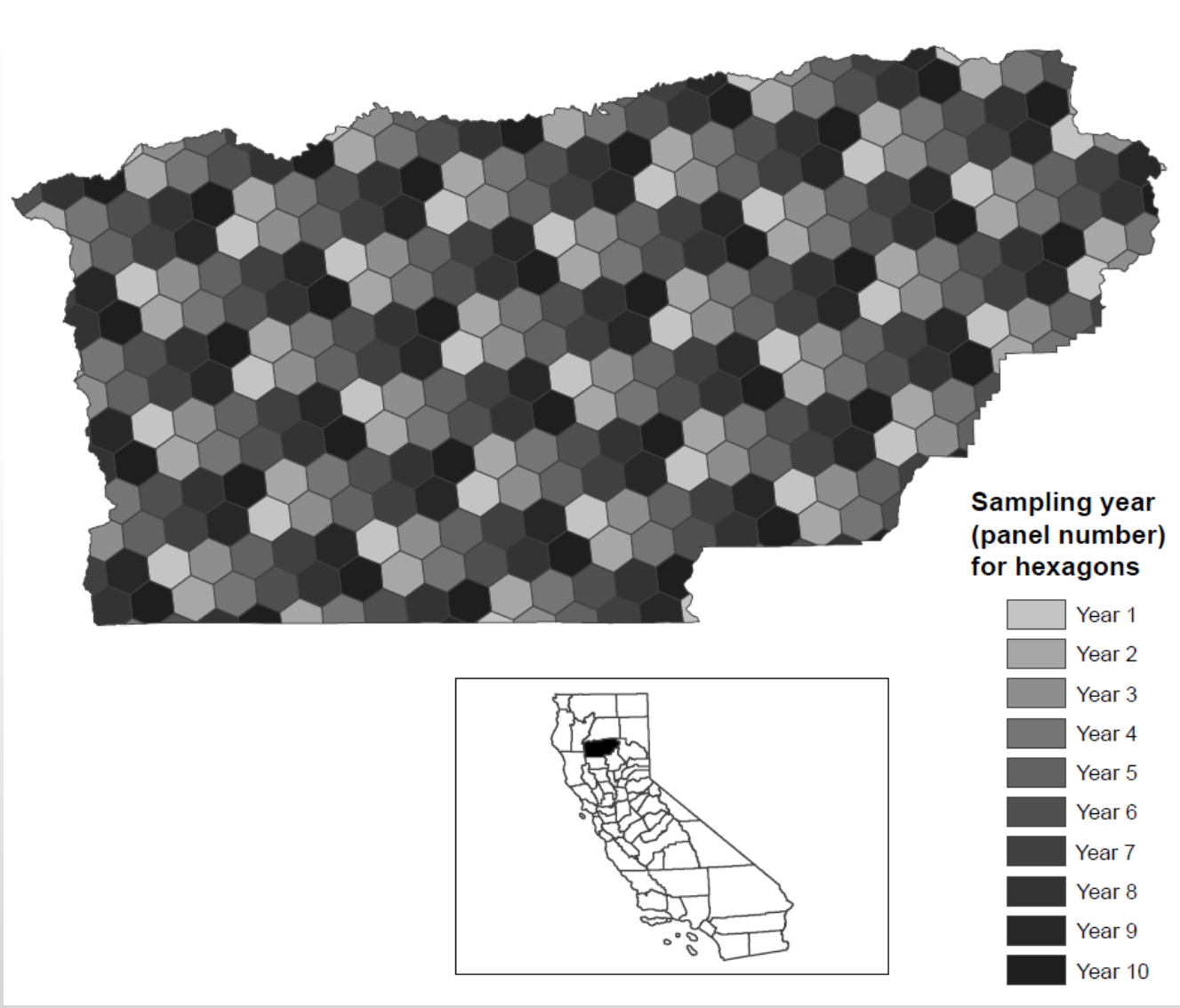
Federated States of Micronesia

Northern Mariana Islands

What is FIA – Sampling & Plot Design

- All forested lands
  - All states, territories, and U.S. affiliated islands
  - All ownerships – public, private, National Parks, wilderness areas, military installations, etc.
- Sampling intensity
  - 10% of all plots measured every year in the western states, 10 year remeasurement cycle
  - Field measured plots permanently located on a grid of 1 plot per 6,000 acres
  - Some eastern states “buy down” the cycle length and sampling grid intensity through matched contributions

FIA Sampling Strategy – Tehama County, CA



10-Year Cycle: 1/10th of FIA field plots are sampled per year in western U.S.

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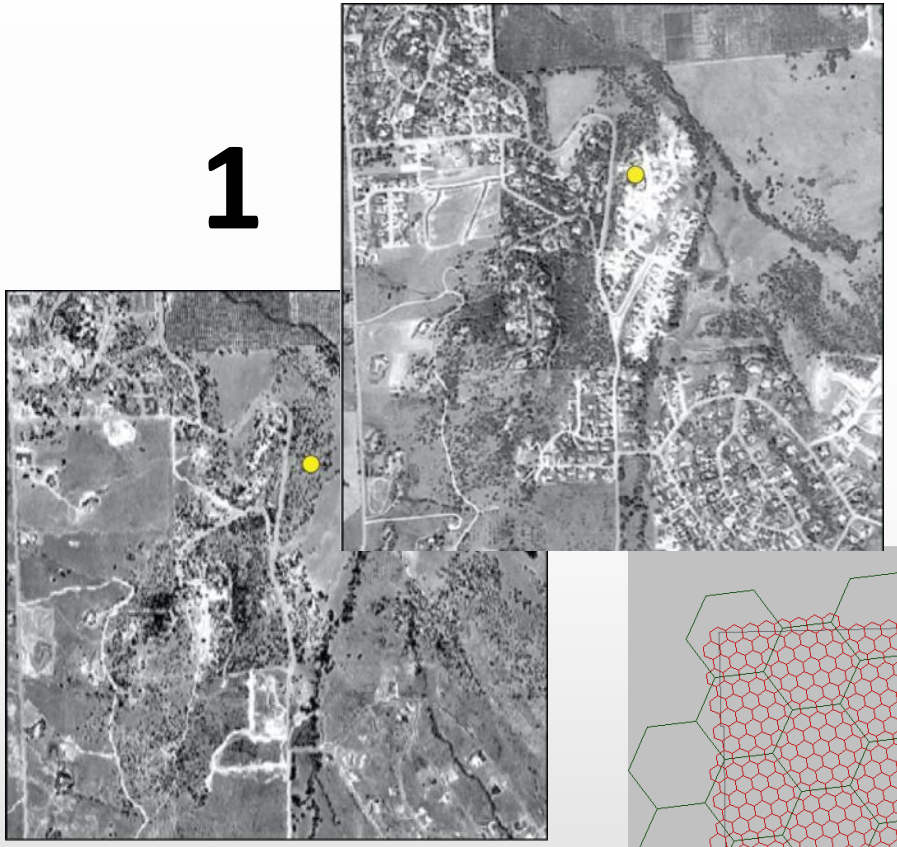
- 3 phase sampling design

3 Phase Sample Design



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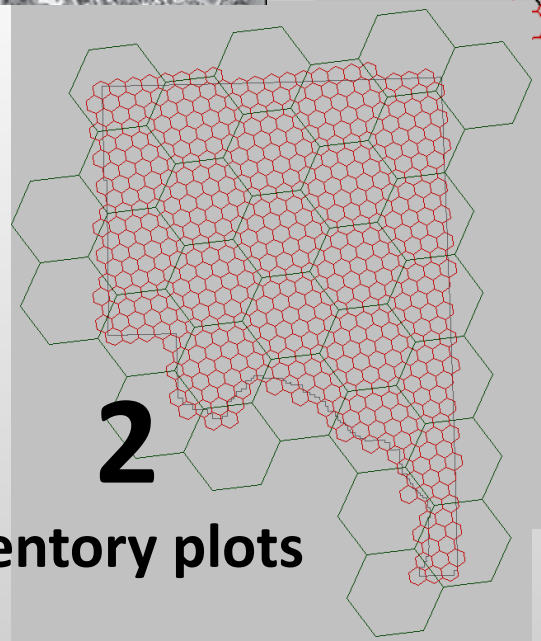
Remote sensing



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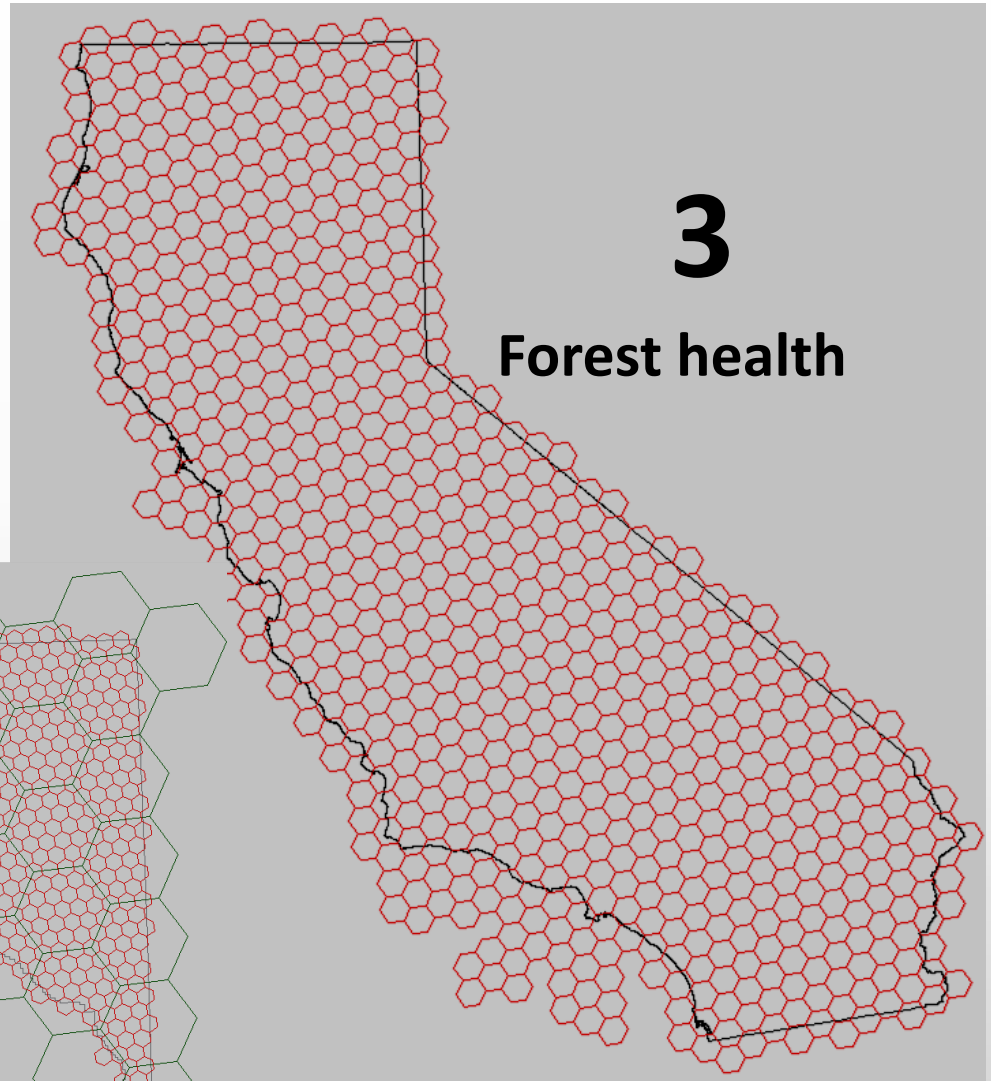
Inventory plots



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Forest health

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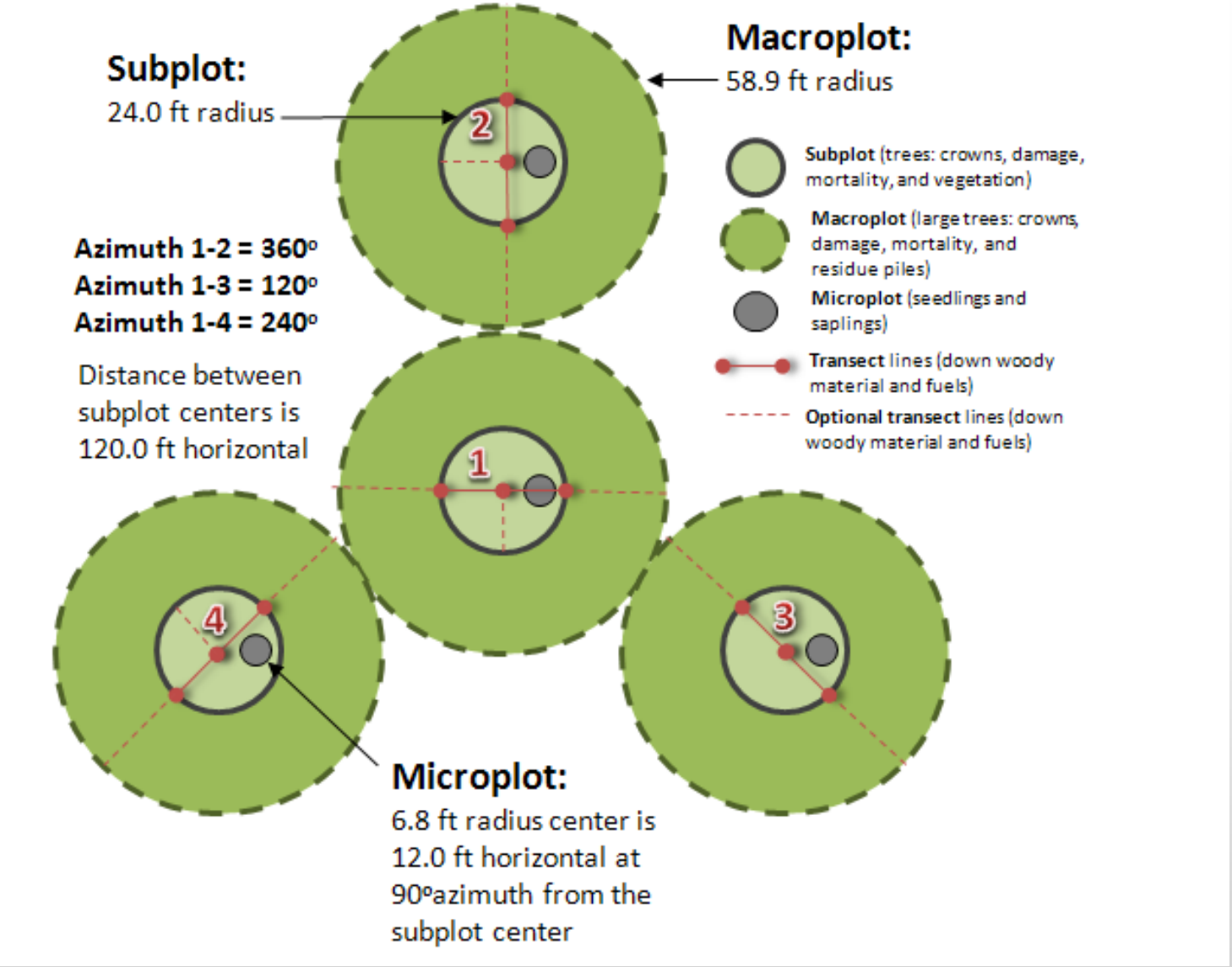
- Phase 2 field measured inventory plots are a cluster of 4 subplots

Phase 2 – Field plot design



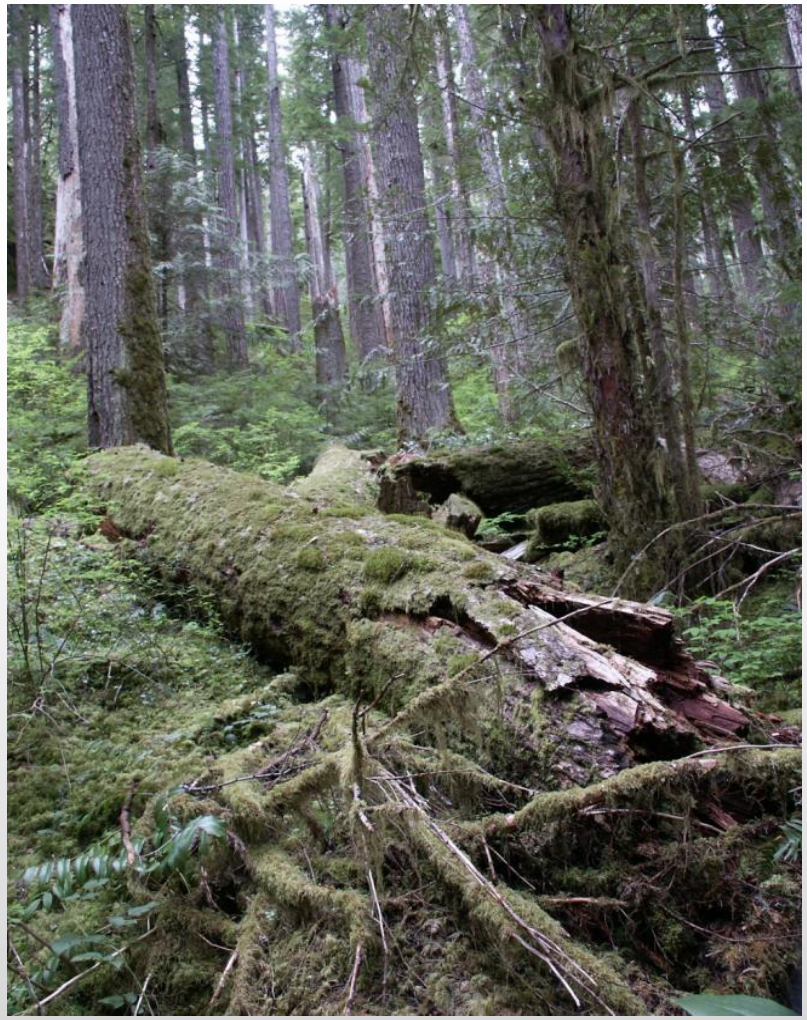
What is FIA – Optional Add-ons

Regional Add-ons

- Down wood
- Understory vegetation
- Damages, insects, disease

R5 National Forest add-ons:

- Ground cover
- Invasive species
- Non-forest lands



What is FIA - Confidentiality

- Private ownership information is confidential
  - All plot estimates are provided as summary information in tables
  - Database only provides plot ownership group, ex. Private.
- Plot location is confidential
  - Exact plot location information is not made public
  - Database provides “fuzzed” plot locations
- Why – To protect landowners and integrity of data

What is FIA – Timber Products Output

FIA also reports on the current timber harvest and forest products industry in each state

- Mill census conducted every 5-years
- Includes manufactures of primary products – lumber, veneer, etc.
- Reporting on mill residues - sawdust, bark, etc.
- Residue utilization sector – manufactures of particleboard, fuel pellets, bioenergy facilities, etc.
- Details the quantity and trends of products and production capacity

What is FIA – National Website

- Online data retrieval and custom query tool – FIDO
- FIA DataMart – Forest land and Urban data
- Documentation
  - Field procedures
  - Database
- National Woodland Owner Survey – tables

FIA online: www.fia.fs.fed.us

Net volume of live trees (at least 5 inches d.b.h./d.r.c.), in cubic feet by Species group and Diameter class

Report display

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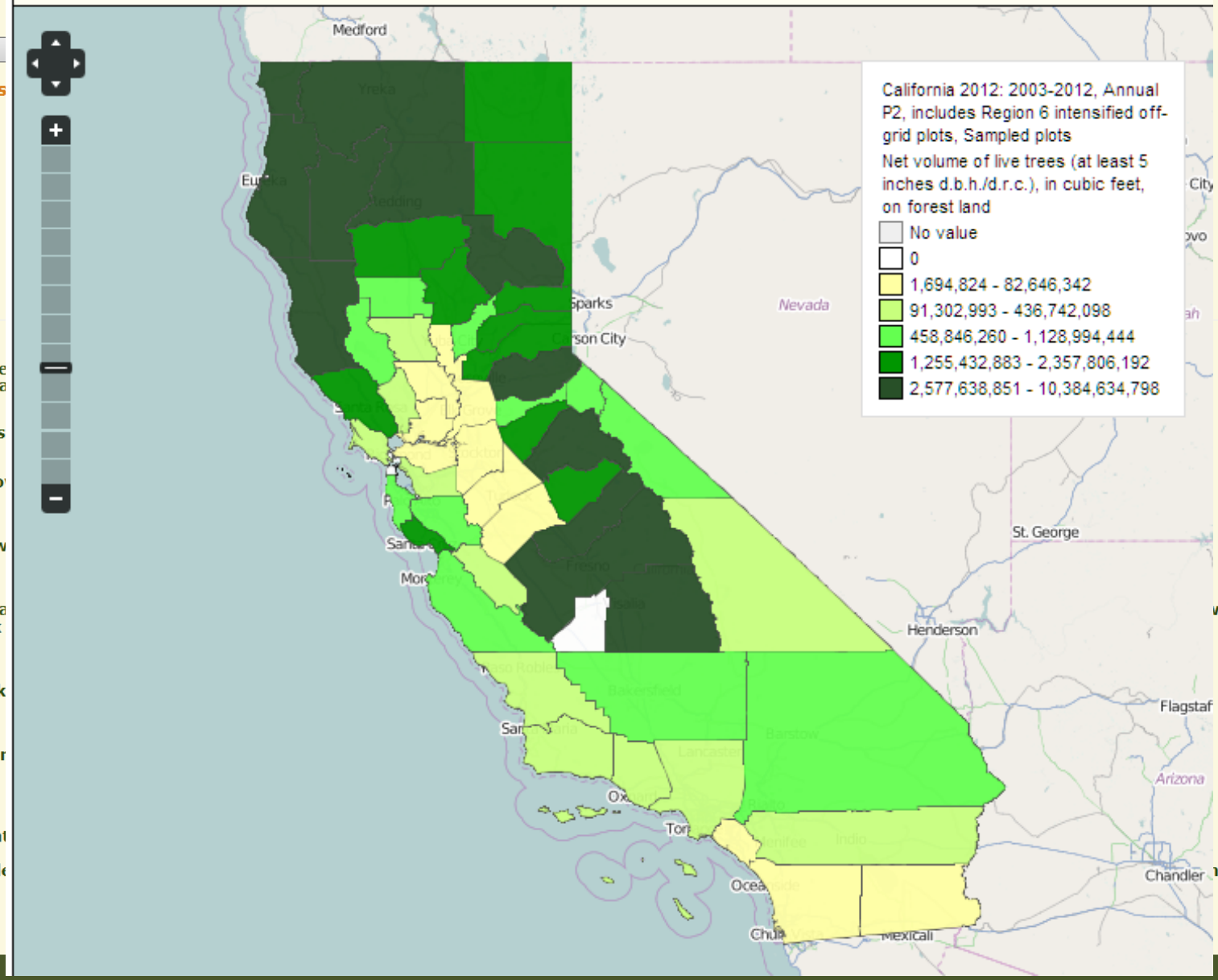

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U.S. Forest Service
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(703) 605-4177

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FIA User Alerts.

Data and Tools

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EVALIDator — This

FIA DataMart — Do

Urban DataMart — Dow

Other Reporting Tools — Crea link

Other Data — Link

Training and Tutorials — Lear

Customer Service — Cont To l

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the FIA Library.

What is FIA – PNW-FIADB

FIA in California

- Initial measurement completed 2001-2010
  - Statewide forest resource statistics for all 32.8 million acres of forest land
  - Data collected on 5,575 field measured plots on all forest land
    - 2,759 plots on National Forests
    - 2,090 plots on private ownerships (corporate and individual)
    - 799 plots on other public lands (federal, state, and local)
- 2016 field season - year 6 of first remeasurement under annualized sample design
- ICE – Image-Based Change Estimation: CA trial using 2005 to 2014
- TPO – Additional funds needed to complete next survey and update logging residue utilization factors

FIA Field Measured Plots in California

5,575 plots measured on 32.8 million acres of forest land between 2001 and 2010

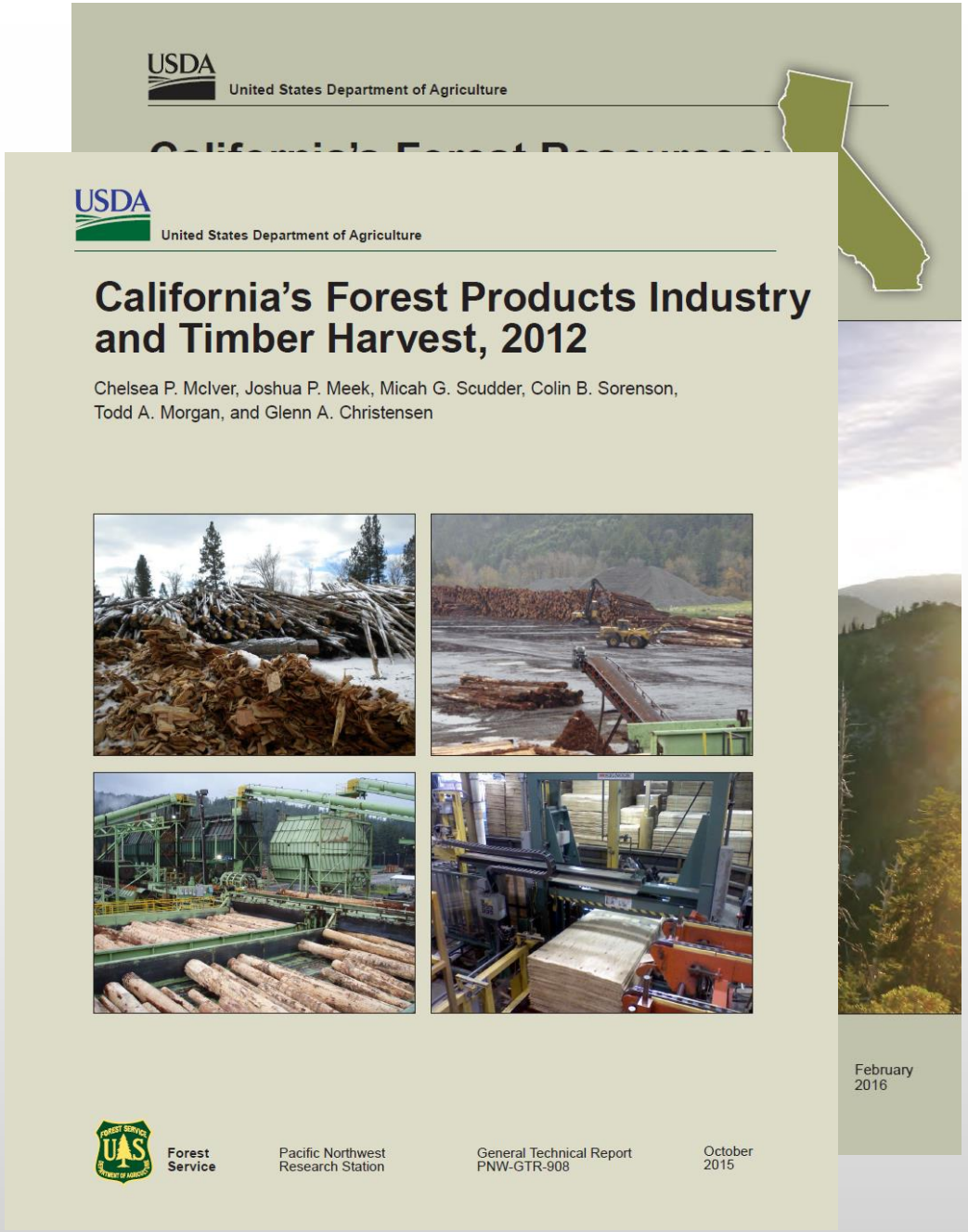
2011 started remeasurement of all 5,575 plots

2016 field season – 6th year of remeasurement, completed 60% of all plots

FIA in California

Recent reports

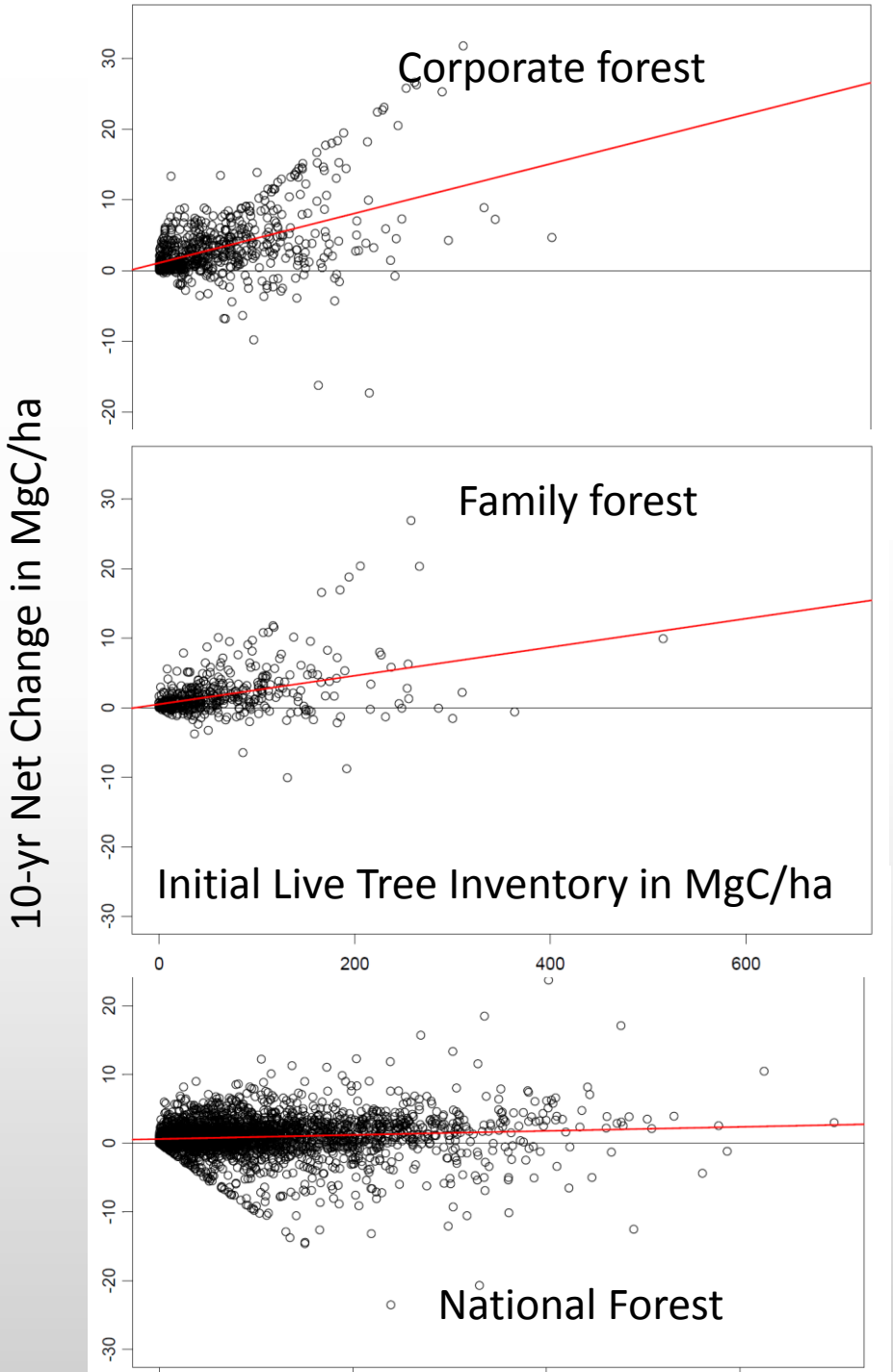
- PNW-GTR-913, 2016: Reporting first full measurement – includes estimates of growth, removals, and mortality based on earlier 1990's measurements and subset of remeasured plots on National Forests.
- PNW-GTR-908, 2015: 2012 Timber Products Output (TPO) report



FIA – Improved Forest Inventory Monitoring Under AB32

Why is FIA a good fit?

- National program providing consistent
  - Field collection protocol
  - Compilation system
  - Public database
  - Summary reporting
- Statistically defensible sampling design
  - Unbiased and independent estimates of current status and change
  - Permanently located plots providing ground-based remeasurement
- Annually updated estimates on all forest land and carbon pools with sampling error
  - Statewide %SE: Area = <1% (95% CI = +/- 1.2%) Volume = 1.45% (95% CI = +/- 2.84%)
- Current net rate of carbon sequestration based on measured change
- FIA forest carbon estimates currently used for reporting to national and international reporting mandates

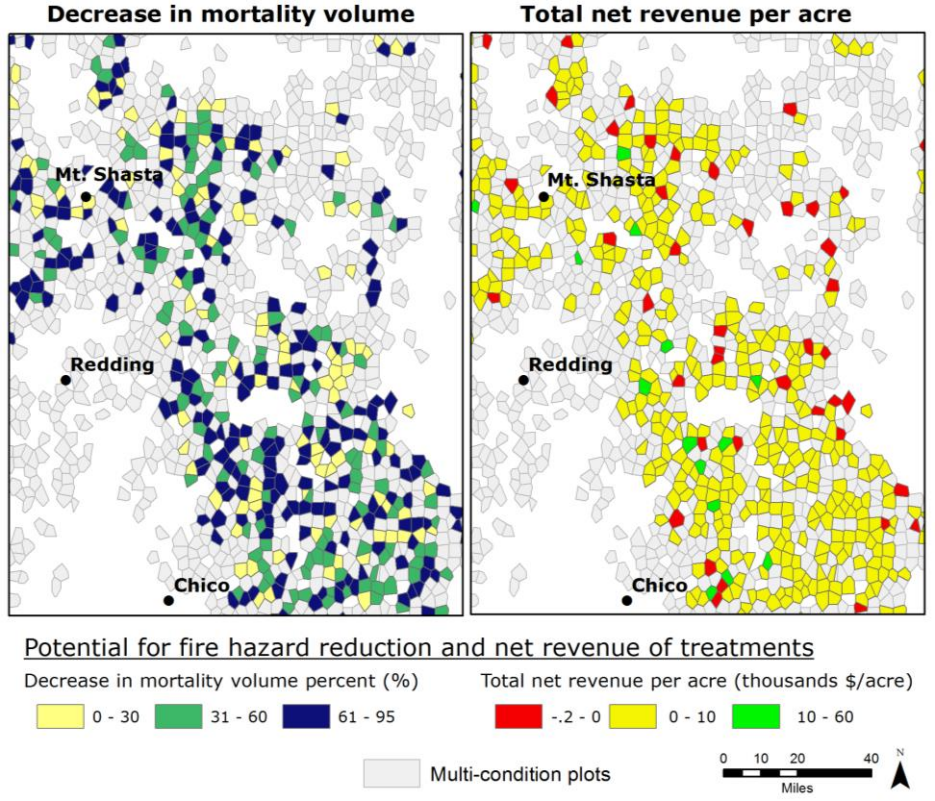


FIA tells change stories

- 10 year tree-to-tree remeasurement for CA, OR & WA
- Net Change = Net Growth
  + Harvest
  - Mortality
- Each dot = 1 plot
- Owner = management proxy
- Positive slope→ Climate benefits
- High within owner variability
  - Difficult to predict project benefits
- Loss of carbon rare on Private
- Apparently high mortality on NFS

BioSum Analysis Framework:

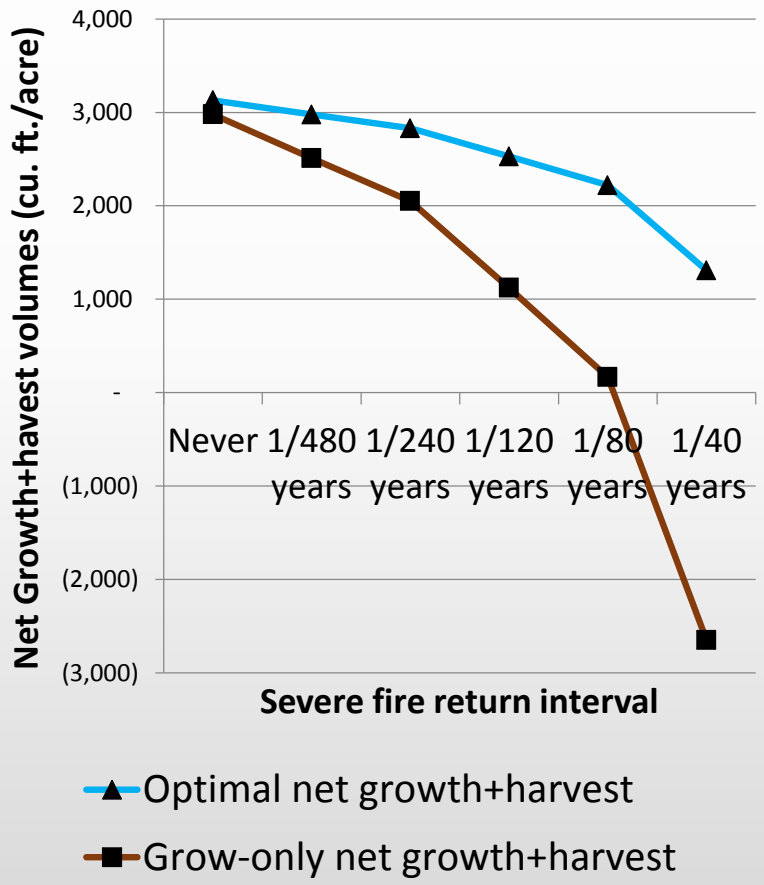
Bioregional Inventory Originated Simulation Under Managment



- Inventory-originated, stand projection model-assisted, simulation and COMPARISON among multiple, alternative, multi-decade forest management sequences wrt
  1. Stand structure & composition,
  2. Resilience to stressors,
  3. Climate benefits (sequestration, products storage, substitution),
  4. Product quantities produced,
  5. Revenues & costs associated with management, and
  6. Viability of candidate mill and biorefinery locations

Extends FIA to management outcomes:

Carbon-optimal treatment: Minimize tree volume killed



What if California's fire-prone timberland forest types were managed for fire hazard reduction?

How would this impact inventory and carbon sequestration over 40 years?

As fire intervals shrink, grow-only becomes a losing strategy for obtaining climate benefits.

FIA Estimates Supporting AB1504 – 2015

- Statewide estimates of area, volume, biomass, and carbon stocks by
  - Land status
    - All forest land, timberland, reserved forest land, and low productivity forest land
  - Ownership
    - National Forests, BLM, National Parks, other Federal, state, local government, private
    - Private – divided into corporate, non-corporate at the state level
  - Forest type
  - Stocking
  - Productivity – site class

FIA Estimates Supporting AB1504 – 2015 Carbon Stocks

- Carbon stocks estimated by pool – used 10-year moving average (2001-2010 to 2005-2014)
  - Live trees
  - Dead trees
  - Live understory
  - Down wood and litter – up to 2010
  - Below ground (model based)
  - Soil (model based)

FIA Estimates Supporting AB1504 – 2015 Carbon Flux

- Based on estimate of change over 2 time intervals & groups of plots
  - 2001-2006 and 2007-2010 for National Forests and other Federal ownerships
  - 1991-1994 and 2007-2010 for all other ownerships
- Rate of net annual carbon sequestration from California's forests
  - Combined statewide estimate of 9.6 million metric tons CO2 equivalent per year
  - Accounting for annual rate of growth, mortality, and harvest
  - Does not include change in down wood, soil carbon, or harvested wood products over this period of time

AB1504 Reporting – 2016+ Highlights

- Develop set of standardized forest carbon summary tables for annual AB1504 reporting to California Board of Forestry
- Update all estimates of carbon stocks and stock changes to include 2015 plot measurements
- Update estimate of net annual carbon sequestration
- Establish Forest Management Reference Levels
- Refine stock estimates as new data and algorithms become available
- Account for harvested wood products
- Initial estimates of forest carbon stocks projected forward through 2020

AB1504 Reporting – 2016+ Status and Stocks

- Update all statewide estimates of area, volume, biomass, and carbon stocks - based on 10-year moving average
- Include down wood and litter carbon pool estimates through 2015
- Add foliage estimates to live tree carbon pool
- Account for structural decay in standing dead tree carbon pool
- Provide regional summaries of carbon stocks by ecoregions
- Establish Forest Management References Levels based on 2001-2010 plot measurements - in accordance with IPCC guidelines under the Kyoto Protocol

AB1504 Reporting – 2016+ Carbon Flux

- Update statewide rate of net annual carbon sequestration
- Estimate of stock change fully based on annualized plot measurements
- 2015 measurements include the first 5 years of remeasurement over 10-year intervals to evaluate stock change
- Each remeasurement interval represents 10% of all forest land
- Combined, estimate represents rate of sequestration from 50% of all FIA plots in CA

10 yr Plot Remeasurement Interval		
Year First Measured	Year Remeasured	% Plots Remeasured
2001	2011	10
2002	2012	20
2003	2013	30
2004	2014	40
2005	2015	50

In summary -

- FIA will continue to work with BOF to address current needs
- Improvement of forest inventory and monitoring to ensure AB32 forestry sector targets are met.
- AB1504 update based on most recent measurements from 2015
- Initial 2016 report delivery in 6 months
- Template for future annual reporting to BOF in form of tables and summaries

FIA online:
www.fia.fs.fed.us